(CBGS)

SE comp Applied Mathematics - III 31 May 2014
SE IT III

(CBGS)

QP Code : NP-18619

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No.1 is **compulsory.**
(2) Attempt any **three** questions from Question No.**2** to Question No.**6.**
(3) Non-programmable **calculator** is **allowed.**

1. (a) Find $L^{-1}\left[\frac{Se^{-\pi s}}{S^2+2S+2}\right]$ **5**

(b) State true or false with proper justification "There does not exist an analytic function whose real part is $x^3 - 3x^2y - y^3$". **5**

(c) Prove that $f_1(x) = 1$, $f_2(x) = x$, $f_3(x) = \frac{(3x^2-1)}{2}$ are orthogonal over $(-1, 1)$. **5**

(d) Using Green's theorem in the plane, evaluate $\int_c (x^2 - y)dx + (2y^2 + x)dy$ around the boundary of the region defined by $y = x^2$ and $y = 4$. **5**

2. (a) Find the fourier cosine integral representation of the function $f(x) = e^{-ax}, x > 0$ and hence show that $\int_0^\infty \frac{\cos ws}{1+w^2}dw = \frac{\pi}{2}e^{-x}, x \geq 0$. **6**

(b) Verify laplaces equation for $U = \left(r + \frac{a^2}{r}\right)\cos\theta$ Also find V and f(z). **6**

(c) Solve the following eqn. by using laplace transform $\frac{dy}{dt} + 2y + \int_0^t ydt = \sin t$ given that $y(o) = 1$. **8**